

SEP 06 2006

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

Amendments to the Claims:

The following Listing of Claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Cancelled) Fused, crystalline abrasive particle comprising at least 20 percent by volume, based on the total metal oxide volume of said particle, eutectic material, wherein said eutectic material comprises eutectic of at least:

(a) crystalline ZrO_2 and

(b) at least two of:

(i) crystalline Al_2O_3 ,

(ii) first crystalline complex $Al_2O_3 \cdot Y_2O_3$, or

(iii) second, different, crystalline complex $Al_2O_3 \cdot Y_2O_3$.

2. (Previously Presented) The plurality of abrasive particles according to claim 41 wherein said fused, crystalline abrasive particles comprise at least 50 percent by volume, based on the total metal oxide volume of the respective particle, of said eutectic material.

3. (Previously Presented) The plurality of abrasive particles according to claim 2 comprising, on a theoretical oxide basis, at least 40 percent by weight Al_2O_3 , based on the total metal oxide content of the respective particle.

4. (Previously Presented) The plurality of abrasive particles according to claim 3, wherein said fused, crystalline abrasive particles further comprise primary crystals of Al_2O_3 .

5. (Previously Presented) The plurality of abrasive particles according to claim 3, wherein said fused, crystalline abrasive particles comprise colonies of said eutectic, and wherein said colonies have an average size of less than 100 micrometers.

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

6. (Previously Presented) The plurality of abrasive particles according to claim 5, wherein said colonies have an average size of less than 50 micrometers.

7. (Previously Presented) The plurality of abrasive particles according to claim 3, wherein said fused, crystalline abrasive particles comprise colonies of said eutectic, and wherein crystals making up said colonies are, on average, up to 10 micrometers in size.

8. (Previously Presented) The plurality of abrasive particles according to claim 7, wherein said crystals are, on average, up to 1 micrometer in size.

9. (Currently Amended) The plurality of abrasive particles according to claim 3, wherein said fused, crystalline abrasive particles further ~~comprise~~ comprises at least one of crystalline rare earth oxide or crystalline complex Al_2O_3 -rare earth oxide.

10. (Previously Presented) The plurality of abrasive particles according to claim 3, wherein said fused, crystalline abrasive particles further comprise at least one of crystalline BaO, CaO, Cr_2O_3 , CoO, Fe_2O_3 , HfO_2 , Li_2O , MgO, MnO, NiO, SiO_2 , TiO_2 , Na_2O , Sc_2O_3 , SrO, V_2O_3 , ZnO, or complex Al_2O_3 -metal oxide thereof.

11. (Previously Presented) The plurality of abrasive particles according to claim 3, wherein said fused, crystalline abrasive particles have an average microhardness of at least 13 GPa.

12. (Currently Amended) The plurality of abrasive particles according to claim 3, wherein at least one of said first crystalline complex Al_2O_3 - Y_2O_3 or said second, different, crystalline complex Al_2O_3 - Y_2O_3 further comprises cations selected from the group consisting of Cr, Ti, Sc, Fe, Mg, Ca, Si, Co, Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Pr, Sm, Th, Tm, Yb, and combinations thereof.

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

13. (Currently Amended) A plurality of abrasive particles having a specified nominal grade, said plurality of abrasive particle having a particle size distribution ranging from fine to coarse, wherein at least a portion of said abrasive particles is a plurality of fused, crystalline abrasive particles, ~~said fused abrasive particles comprising at least 20 percent by volume, based on the total metal oxide volume of the respective particle, eutectic material,~~ wherein said eutectic material comprises eutectic of at least:

(a) crystalline ZrO_2 and

(b) at least two of:

(i) crystalline Al_2O_3 ,

(ii) first crystalline complex $Al_2O_3 \cdot Y_2O_3$, or

(iii) second, different, crystalline complex $Al_2O_3 \cdot Y_2O_3$, wherein said fused, crystalline abrasive particles comprise at least 50 percent by volume, based on the total metal oxide volume of the respective particle, of said eutectic material, wherein the abrasive particles comprising, on a theoretical oxide basis, at least 40 percent by weight Al_2O_3 , based on the total metal oxide content of the respective particle, and wherein a portion of at least one of said first crystalline complex $Al_2O_3 \cdot Y_2O_3$ or said second, different, crystalline complex $Al_2O_3 \cdot Y_2O_3$ Al cations are substituted with at least one cation selected from the following cations: Cr, Ti, Sc, Fe, Mg, Ca, Si, and Co.

14. (Currently Amended) A plurality of abrasive particles having a specified nominal grade, said plurality of abrasive particle having a particle size distribution ranging from fine to coarse, wherein at least a portion of said abrasive particles is a plurality of fused, crystalline abrasive particles, ~~said fused abrasive particles comprising at least 20 percent by volume, based on the total metal oxide volume of the respective particle, eutectic material,~~ wherein said eutectic material comprises eutectic of at least:

(a) crystalline ZrO_2 and

(b) at least two of:

(i) crystalline Al_2O_3 ,

(ii) first crystalline complex $Al_2O_3 \cdot Y_2O_3$, or

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

(iii) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, wherein said fused, crystalline abrasive particles comprise at least 50 percent by volume, based on the total metal oxide volume of the respective particle, of said eutectic material, wherein the abrasive particles comprising, on a theoretical oxide basis, at least 40 percent by weight Al_2O_3 , based on the total metal oxide content of the respective particle, and wherein a portion of at least one of said first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$ or said second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$ Y cations are substituted with at least one cation selected from the following cations: Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Pr, Sm, Th, Tm, and Yb.

15. (Currently Amended) A plurality of abrasive particles having a specified nominal grade, said plurality of abrasive particle having a particle size distribution ranging from fine to coarse, wherein at least a portion of said abrasive particles is a plurality of fused, crystalline abrasive particles, ~~said fused abrasive particles comprising at least 20 percent by volume, based on the total metal oxide volume of the respective particle, eutectic material,~~ wherein said eutectic material comprises eutectic of at least:

(a) crystalline ZrO_2 and

(b) at least two of:

(i) crystalline Al_2O_3 ,

(ii) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, or

(iii) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, wherein said fused, crystalline abrasive particles comprise at least 50 percent by volume, based on the total metal oxide volume of the respective particle, of said eutectic material, wherein the abrasive particles comprising, on a theoretical oxide basis, at least 40 percent by weight Al_2O_3 , based on the total metal oxide content of the respective particle, and wherein a portion of at least one of said first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$ or said second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$ Y cations are substituted with at least one cation selected from the following cations: Fe, Ti, Mn, V, Cr, Co, Ni, Cu, Mg, Ca, and Sr.

16. (Previously Presented) The plurality of abrasive particles according to claim 2, said fused, crystalline abrasive particles further comprise primary crystals of $\text{Y}_3\text{Al}_5\text{O}_{12}$.

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

17. (Previously Presented) The plurality of abrasive particles according to claim 41, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) crystalline Al_2O_3 , and (c) crystalline complex $\text{Al}_2\text{O}_3\cdot\text{Y}_2\text{O}_3$.

18. (Previously Presented) The plurality of abrasive particles according to claim 17 comprising at least 50 percent by volume, based on the total metal oxide volume of the respective particle, of said eutectic material.

19. (Previously Presented) The plurality of abrasive particles according to claim 18 comprising, on a theoretical oxide basis, at least 40 percent by weight Al_2O_3 , based on the total metal oxide content the respective particle.

20. (Previously Presented) The plurality of abrasive particles according to claim 19, wherein said fused, crystalline abrasive particles comprise colonies of said eutectic, and wherein crystals making up said colonies are, on average, up to 10 micrometers in size.

21. (Previously Presented) The plurality of abrasive particles according to claim 19, wherein said fused, crystalline abrasive particles further comprise at least one of crystalline BaO , CaO , Cr_2O_3 , CoO , Fe_2O_3 , HfO_2 , Li_2O , MgO , MnO , NiO , SiO_2 , TiO_2 , Na_2O , SrO , Sc_2O_3 , V_2O_3 , ZnO , or complex $\text{Al}_2\text{O}_3\cdot\text{metal oxide}$ thereof.

22. (Previously Presented) The plurality of abrasive particles according to claim 19, wherein said fused, crystalline abrasive particles have an average microhardness of at least 13 GPa.

23. (Previously Presented) The plurality of abrasive particles according to claim 2, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) first crystalline complex $\text{Al}_2\text{O}_3\cdot\text{Y}_2\text{O}_3$, and (c) second, different, crystalline complex $\text{Al}_2\text{O}_3\cdot\text{Y}_2\text{O}_3$.

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

24. (Previously Presented) The plurality of abrasive particles according to claim 23 comprising at least 50 percent by volume, based on the total metal oxide volume of said particle, of said eutectic material.

25. (Previously Presented) The plurality of abrasive particles according to claim 24 comprising, on a theoretical oxide basis, at least 40 percent by weight Al_2O_3 , based on the total metal oxide content said particle.

26. (Previously Presented) The plurality of abrasive particles according to claim 25, wherein said fused, crystalline abrasive particles comprise colonies of said eutectic, and wherein crystals making up said colonies are, on average, up to 10 micrometers in size.

27. (Previously Presented) The plurality of abrasive particles according to claim 25, wherein said fused, crystalline particles further comprise at least one of crystalline BaO , CaO , Cr_2O_3 , CoO , Fe_2O_3 , HfO_2 , Li_2O , MgO , MnO , NiO , SiO_2 , TiO_2 , Na_2O , SrO , Sc_2O_3 , V_2O_3 , ZnO , or complex Al_2O_3 -metal oxide thereof.

28. (Previously Presented) The plurality of abrasive particles according to claim 25, wherein said fused, crystalline abrasive particles have an average microhardness of at least 13 GPa.

29. (Cancelled) Fused, crystalline abrasive particle comprising at least 20 percent by volume, based on the total metal oxide volume of said particle, eutectic material, wherein said eutectic material comprises eutectic of at least:

(a) crystalline complex $\text{Al}_2\text{O}_3\text{-Y}_2\text{O}_3$ and

(b) crystalline ZrO_2 .

30. (Previously Presented) The plurality of abrasive particles according to claim 44 comprising at least 50 percent by volume, based on the total metal oxide volume of the respective particle, of said eutectic material.

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

31. (Previously Presented) The plurality of abrasive particles according to claim 30 comprising, on a theoretical oxide basis, at least 40 percent by weight Al_2O_3 , based on the total metal oxide content the respective particle.

32. (Previously Presented) The plurality of abrasive particles according to claim 30, wherein said fused, crystalline abrasive particles comprise colonies of said eutectic, and wherein crystals making up said colonies are, on average, up to 10 micrometers in size.

33. (Previously Presented) The plurality of abrasive particles according to claim 30, wherein said fused, crystalline abrasive particles further comprise at least one of crystalline BaO , CaO , Cr_2O_3 , CoO , Fe_2O_3 , HfO_2 , Li_2O , MgO , MnO , NiO , SiO_2 , TiO_2 , Na_2O , SrO , Sc_2O_3 , V_2O_3 , ZnO , or complex Al_2O_3 -metal oxide thereof.

34. (Previously Presented) The plurality of abrasive particles according to claim 30, wherein said fused, crystalline abrasive particles have an average microhardness of at least 13 GPa.

35. (Previously Presented) The plurality of abrasive particles according to claim 30 wherein at least a majority by weight of said crystalline ZrO_2 is cubic ZrO_2 .

36. (Cancelled) A plurality of particles having a particle size distribution ranging from fine to coarse, wherein at least a portion of said plurality of particles are fused, crystalline abrasive particles comprising at least 20 percent by volume, based on the total metal oxide volume of the respective particle, eutectic material, wherein said eutectic material comprises eutectic of at least:

(a) crystalline ZrO_2 and

(b) at least two of:

(i) crystalline Al_2O_3 ,

(ii) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, or

(iii) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

37. (Cancelled) The plurality of particles according to claim 36, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) crystalline Al_2O_3 , and (c) crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

38. (Cancelled) The plurality of particles according to claim 36, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, and (c) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

39. (Cancelled) A plurality of particles having a particle size distribution ranging from fine to coarse, wherein at least a portion of said plurality of particles are fused, crystalline abrasive particles comprising at least 20 percent by volume, based on the total metal oxide volume of the respective particle, eutectic material, wherein said eutectic material comprises eutectic of at least:

- (a) crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$ and
- (b) crystalline ZrO_2 .

40. (Cancelled) The plurality of particles according to claim 39 wherein at least a majority by weight of said crystalline ZrO_2 is cubic ZrO_2 .

41. (Original) A plurality of abrasive particles having a specified nominal grade, said plurality of abrasive particle having a particle size distribution ranging from fine to coarse, wherein at least a portion of said abrasive particles is a plurality of fused, crystalline abrasive particles, said fused abrasive particles comprising at least 20 percent by volume, based on the total metal oxide volume of the respective particle, eutectic material, wherein said eutectic material comprises eutectic of at least:

- (a) crystalline ZrO_2 and
- (b) at least two of:
 - (i) crystalline Al_2O_3 ,
 - (ii) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, or

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

(iii) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

42. (Cancelled) The plurality of abrasive particles according to claim 41, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) crystalline Al_2O_3 , and (c) crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

43. (Cancelled) The plurality of abrasive particles according to claim 41, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, and (c) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

44. (Original) A plurality of abrasive particles having a specified nominal grade, said plurality of abrasive particle having a particle size distribution ranging from fine to coarse, wherein at least a portion of said abrasive particles is a plurality of fused, crystalline abrasive particles, said fused abrasive particles comprising at least 20 percent by volume, based on the total metal oxide volume of the respective particle, eutectic material, wherein said eutectic material comprises eutectic of at least:

- (a) crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$ and
- (b) crystalline ZrO_2 .

45. (Original) The plurality of abrasive particles according to claim 44 wherein at least a majority by weight of said crystalline ZrO_2 is cubic ZrO_2 .

46. (Previously Presented) A method for making fused, crystalline abrasive particles comprising at least 20 percent by volume, based on the total volume of the respective particle, eutectic material, wherein said eutectic material comprises eutectic of at least (a) crystalline ZrO_2 and (b) at least two of (i) crystalline Al_2O_3 , (ii) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, or (iii) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, said method comprising:

melting at least one Al_2O_3 source, at least one Y_2O_3 source, and at least one ZrO_2 source to provide a melt;

converting the melt to said fused, crystalline abrasive particles; and

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

grading said fused, crystalline abrasive particles to provide a plurality of abrasive particles having a specified nominal grade, said plurality of abrasive particles having a particle size distribution ranging from fine to coarse, wherein at least a portion of said plurality of abrasive particles is a plurality of said fused, crystalline abrasive particles.

47. (Previously Presented) The method according to claim 46, wherein converting includes:

cooling the melt to provide a solidified material; and
crushing the solidified material to provide said fused, crystalline abrasive particles.

48. (Previously Presented) The method according to claim 47, wherein cooling the melt includes cooling the melt with metallic plates.

49. (Previously Presented) The method according to claim 47, wherein cooling the melt includes cooling the melt with metallic balls.

50. (Previously Presented) The method according to claim 46, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 (b) crystalline Al_2O_3 , and crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

51. (Previously Presented) The method according to claim 46, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, and (c) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

52. (Previously Presented) A method for making fused, crystalline abrasive particles comprising at least 20 percent by volume, based on the total volume of the respective particle, eutectic material, wherein said eutectic material comprises eutectic of at least (a) crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$ and (b) crystalline ZrO_2 , said method comprising:

melting at least one Al_2O_3 source, at least one Y_2O_3 source, and at least one ZrO_2 source to provide a melt;

converting the melt to said fused, crystalline abrasive particles; and

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

grading said fused, crystalline abrasive particles to provide a plurality of abrasive particles having a specified nominal grade, said plurality of abrasive particles having a particle size distribution ranging from fine to coarse, wherein at least a portion of said plurality of abrasive particles is a plurality of said fused, crystalline abrasive particles.

53. (Original) An abrasive article comprising a binder and a plurality of abrasive particles, wherein at least a portion of said abrasive particles are fused, crystalline abrasive particles comprising at least 20 percent by volume, based on the total volume of the respective particle, eutectic material, wherein said eutectic material comprises eutectic of at least:

(a) crystalline ZrO_2 and

(b) at least two of:

(i) crystalline Al_2O_3 ,

(ii) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, or

(iii) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

54. (Original) The abrasive article according to claim 53, wherein said article is a coated abrasive article, and further comprises a backing.

55. (Original) The abrasive article according to claim 53, wherein said article is a bonded abrasive article.

56. (Original) The abrasive article according to claim 53, wherein said article is a nonwoven abrasive article, and further comprises a nonwoven web.

57. (Original) The abrasive article according to claim 53, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) crystalline Al_2O_3 , and (c) crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

58. (Original) The abrasive article according to claim 53, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, and (c) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

59. (Original) An abrasive article comprising a binder and a plurality of abrasive particles, wherein at least a portion of said abrasive particles are fused, crystalline abrasive particles comprising at least 20 percent by volume, based on the total volume of the respective particle, eutectic material, wherein said eutectic material comprises eutectic of at least:

- (a) crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$ and
- (b) crystalline ZrO_2 .

60. (Original) The abrasive article according to claim 59 wherein at least a majority by weight of said crystalline ZrO_2 is cubic ZrO_2 .

61. (Original) A vitrified bonded abrasive article comprising a plurality of abrasive particles bonded together via vitrified bonding material, wherein at least a portion of said plurality of abrasive particles are fused, crystalline abrasive particles comprising at least 20 percent by volume, based on the total volume of the respective particle, eutectic material, wherein said eutectic material comprises eutectic of at least:

- (a) crystalline ZrO_2 and
- (b) at least two of:
 - (i) crystalline Al_2O_3 ,
 - (ii) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, or
 - (iii) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

62. (Original) The vitrified bonded abrasive article according to claim 61, wherein said vitrified bonding material comprises silica, alumina, and boria.

63. (Original) The vitrified bonded abrasive article according to claim 62, wherein said vitrified bonding material comprises at least 10 percent by weight of said alumina.

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

64. (Original) The vitrified bonded abrasive article according to claim 63, wherein said vitrified bonding material comprises at least 10 percent by weight of said boria.

65. (Original) The vitrified bonded abrasive article according to claim 61, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) crystalline Al_2O_3 , and (c) crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

66. (Original) The vitrified bonded abrasive article according to claim 61, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, and (c) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

67. (Original) A vitrified bonded abrasive article comprising a plurality of abrasive particles bonded together via vitrified bonding material, wherein at least a portion of said plurality of abrasive particles are fused, crystalline abrasive particles comprising at least 20 percent by volume, based on the total volume of the respective particle, eutectic material, wherein said eutectic material comprises eutectic of at least:

(a) crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$ and

(b) crystalline ZrO_2 .

68. (Original) The vitrified bonded abrasive article according to claim 67 wherein at least a majority by weight of said crystalline ZrO_2 is cubic ZrO_2 .

69. (Previously Presented) A method of abrading a surface, said method comprising:
providing an abrasive article comprising a binder and a plurality of abrasive particles, wherein at least a portion of said abrasive particles are fused, crystalline abrasive particle comprising at least 20 percent by volume, based on the total volume of the respective particle, eutectic material, wherein said eutectic material comprises eutectic of at least (a) crystalline ZrO_2 and (b) at least two of (i) crystalline Al_2O_3 , (ii) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, or (iii) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$;

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

contacting at least one of said fused, crystalline abrasive particles with a surface of a workpiece; and

moving at least one of the contacted fused abrasive particle or said surface relative to the other to abrade at least a portion of said surface with the contacted fused abrasive particle.

to the other to abrade at least a portion of said surface with said fused abrasive particle.

70. (Original) The method according to claim 69, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) crystalline Al_2O_3 , and (c) crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

71. (Original) The method according to claim 69, wherein said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, and (c) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

72. (Previously Presented) A method of abrading a surface, said method comprising: providing an abrasive article comprising a binder and a plurality of abrasive particles, wherein at least a portion of said abrasive particles are fused, crystalline abrasive particle comprising at least 20 percent by volume, based on the total volume of the respective particle, eutectic material, wherein said eutectic material comprises eutectic of at least (a) crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$ and (b) crystalline ZrO_2 ;

contacting at least one of said fused, crystalline abrasive particles with a surface of a workpiece; and

moving at least one of the contacted fused abrasive particle or said surface relative to the other to abrade at least a portion of said surface with the contacted fused abrasive particle.

73. (Currently Amended) The method according to claim 72, wherein said eutectic further comprises crystalline Al_2O_3 such that said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) crystalline Al_2O_3 , and (c) crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

74. (Currently Amended) The method according to claim 72, wherein said eutectic further comprises crystalline Al_2O_3 such that said eutectic is eutectic of at least (a) crystalline ZrO_2 , (b) first crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$, and (c) second, different, crystalline complex $\text{Al}_2\text{O}_3 \cdot \text{Y}_2\text{O}_3$.

75. (Previously Presented) The plurality of abrasive particles according to claim 41 wherein said specified nominal grade is selected from the group consisting of ANSI 16, ANSI 24, ANSI 36, ANSI 40, ANSI 50, ANSI 60, ANSI 80, ANSI 100, ANSI 120, ANSI 150, ANSI 180, ANSI 220, ANSI 240, ANSI 280, ANSI 320, ANSI 360, ANSI 400, and ANSI 600.

76. (Previously Presented) The plurality of abrasive particles according to claim 41 wherein said specified nominal grade is selected from the group consisting of P16, P24, P36, P40, P50, P60, P80, P100, P120, P150, P180, P220, P320, P400, P500, P600, P800, P1000, and P1200.

77. (Previously Presented) The plurality of abrasive particles according to claim 41 wherein said specified nominal grade is selected from the group consisting of JIS16, JIS24, JIS36, JIS46, JIS54, JIS60, JIS80, JIS100, JIS150, JIS180, JIS220, JIS240, JIS280, JIS320, JIS360, JIS400, JIS600, JIS800, JIS1000, JIS1500, JIS2500, JIS4000, JIS6000, JIS8000, and JIS10,000.

78. (Previously Presented) The plurality of abrasive particles according to claim 44 wherein said specified nominal grade is selected from the group consisting of ANSI 16, ANSI 24, ANSI 36, ANSI 40, ANSI 50, ANSI 60, ANSI 80, ANSI 100, ANSI 120, ANSI 150, ANSI 180, ANSI 220, ANSI 240, ANSI 280, ANSI 320, ANSI 360, ANSI 400, and ANSI 600.

79. (Previously Presented) The plurality of abrasive particles according to claim 44 wherein said specified nominal grade is selected from the group consisting of P16, P24, P36, P40, P50, P60, P80, P100, P120, P150, P180, P220, P320, P400, P500, P600, P800, P1000, and P1200.80. (Previously Presented) The plurality of abrasive particles according to claim 44

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

wherein said specified nominal grade is selected from the group consisting of JIS16, JIS24, JIS36, JIS46, JIS54, JIS60, JIS80, JIS100, JIS150, JIS180, JIS220, JIS240, JIS280, JIS320, JIS360, JIS400, JIS600, JIS800, JIS1000, JIS1500, JIS2500, JIS4000, JIS6000, JIS8000, and JIS10,000.

81. (Currently Amended) The method according to claim 69 wherein said surface is selected from the group of metals consisting of aluminum, carbon steel, mild steel tool, steel, stainless steel, hardened steel, and titanium.

82. (Previously Presented) The method according to claim 69 wherein said surface is aluminum.

83. (Previously Presented) The method according to claim 69 wherein said surface is carbon steel.

84. (Previously Presented) The method according to claim 69 wherein said surface is mild steel.

85. (Previously Presented) The method according to claim 69 wherein said surface is tool steel.

86. (Previously Presented) The method according to claim 69 wherein said surface is stainless steel.

87. (Previously Presented) The method according to claim 69 wherein said surface is titanium.

88. (Previously Presented) The method according to claim 69 wherein said surface is wood.

BEST AVAILABLE COPY

Application No.: 09/618,876

Case No.: 55763US002

89. (Currently Amended) The method according to claim 72 wherein said surface is selected from the group of metals consisting of aluminum, carbon steel, mild steel tool, steel, stainless steel, hardened steel, and titanium.